

**Effect of Carbon Nano Tubes (CNTs) on Mechanical & Material response of
Normal Weight Concrete**



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Dedication

I dedicate this research to

Dr. Muhammad Shahid Siddique, my mentor

And

To my parents

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All praise be to Almighty Allah alone

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ABSTRACT

Multi-walled carbon nanotubes (MWCNTs) belong to the most promising family of nano-materials. Due to its potential of effectively altering the characteristics of cement matrices it has been the topic of significant research during the last few decades. However, it is also evident that effective dispersion of these nano-metric sized materials in the cement composites has remained a long standing problem. The present research, focused on use of natural surfactant acacia gum along with MWCNTs. In total, five different formulations containing 0.0, 0.005, 0.01, 0.04 and 0.08% MWCNTs by weight percent of cement were evaluated at the age of 28 days in terms of compressive strength, tensile strength and flexural strength. Materials properties were characterized through insoluble residue, specific gravity, particle size, fineness modulus, water absorption, bulk density and x-ray fluorescence test. Test results of U-V Spectroscopy depicted significantly high absorbance value of 2.81 at wavelength of 520-nm for MWCNTs to Surfactant ratio of 1:1 as compared to 0.5:1, 1:2, 1:3, 1:4, 1:5. Furthermore, concrete samples modified with maximum 0.08% of MWCNTs showed 33% increase in compressive strength, 71% increase in tensile strength, and 55% increase in flexural strength as compared to control specimen. Thus, effective utilization of MWCNTs in cementitious environment can result in improved mechanical response of conventional Normal Weight Concrete.

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